FACT SHEET FOR STATE WASTE DISCHARGE PERMIT NO. ST-9005

SNOQUALMIE PASS UTILITY DISTRICT

DATE OF THIS FACT SHEET - MAY 5, 2006

DATE OF EXPIRING PERMIT - JUNE 30, 2011

SUMMARY

The Snoqualmie Pass Utility District (SPUD) is seeking re-issuance of its State Waste Discharge Permit. This utility district operates both water delivery and wastewater treatment for commercial businesses and private residences in an area encompassing portions of western Kittitas and eastern King Counties at Snoqualmie Pass, along Interstate Highway 90, at Snoqualmie Pass. This region's climate is characterized by abundant precipitation, a large portion of which falls as snow and rain from November through April. The economy at Snoqualmie Pass is largely recreationally based, with winter-time skiing predominating. The Summit At Snoqualmie operates four separate ski areas, with the skier visitation rate averaging 3,700 per day. The visitation rate exhibits a large variation, ranging from 150 to 10,000 visitors per day.

The District's wastewater treatment facilities consist of the collection system, a two-cell partially aerated lagoon system, effluent disinfection with chlorination, and sprayfield land treatment. The sprayfield is located on a forested hillside, under a Special Use Permit issued by the United States Forest Service.

The influent flow volume in the fall, winter, and spring is approximately double the volume in the summer months. The large winter-time influent flow rates necessitate the utilization of the sprayfield in the winter-time because the lagoon's storage volume is not sufficient to hold the winter-time wastewater. Typically, the Department of Ecology (Department) only permits sprayfield land treatment of wastewater during the summer growing season, when the vegetation and soil microbiology nutrient uptake is at its optimum. Since winter-time biological activity in the soil profile is significantly reduced, the application of wastewater during the winter at Snoqualmie Pass has the potential to violate ground and surface water standards. Therefore, the proposed permit requires the Permittee to complete a Water Quality Monitoring Project. The Water Quality Monitoring Project may reveal that effluent discharged to the sprayfield violates, or has the potential to violate Surface Water Quality Standards. In that case, the following wastewater discharge permit issued five years hence, may be a National Pollution Discharge Elimination System (NPDES) permit and/or more monitoring studies may be required.

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INTRODUCTION

This fact sheet is a companion document to the draft State Waste Discharge Permit No. ST-9005. The Department of Ecology (the Department) is proposing to issue this permit, which will allow discharge of wastewater to waters of the State of Washington. This fact sheet explains the nature of the proposed discharge, the Department's decisions on limiting the pollutants in the wastewater, and the regulatory and technical bases for those decisions.

Washington State law (RCW 90.48.080 and 90.48.162) requires that a permit be issued before discharge of wastewater to waters of the state is allowed. Regulations adopted by the State include procedures for issuing permits (Chapter 173-216 WAC), technical criteria for discharges from municipal wastewater treatment facilities (Chapter 173-221 WAC) and water quality criteria for ground waters (Chapter 173-200 WAC). They also establish the basis for effluent limitations and other requirements which are to be included in the permit.

This fact sheet and draft permit are available for review by interested persons as described in Appendix A--Public Involvement Information.

The fact sheet and draft permit have been reviewed by the Office of Environmental Health & Safety of the Washington State Department of Health and by the Permittee. Errors and omissions identified in these reviews have been corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. The fact sheet will not be revised. Changes to the permit will be addressed in Appendix D--Response to Comments.

GENERAL INFORMATION	
Applicant	Snoqualmie Pass Utility District
Facility Name and Address	370 Treatment Plant Road; Snoqualmie Pass; WA
Type of Treatment System:	Land Application
Discharge Location	Latitude: 47° 22' 32"N Longitude: 121° 23' 51"W (WGS84/NAD83)
Legal Description of Application Area	SW1/4, E1/2, NW1/4, Section 22, Township. 22N, Range 11 E.W.M. SW1/4, Section 22, Township. 22N, Range 11 E.W.M.
Contact at Facility	Name: Terry Lenihan Telephone #: 425-434-6633
Responsible Official	Name: Terry Lenihan Title: General Manager Address: PO Box 131; Snoqualmie Pass; WA 98068 Telephone # 425-434-6633 FAX # 425-434-6615

BACKGROUND INFORMATION

DESCRIPTION OF THE COLLECTION AND TREATMENT SYSTEM

History

The original Utility District wastewater treatment facility (WWTP) at Snoqualmie Pass was constructed in 1968 with a design capacity of 0.14 MGD. This original WWTP discharged effluent through an outfall to Coal Creek, which flows into Lake Keechelus. In 1979 the first Facility Plan for the Utility District was completed and approved by the Department. Construction of the existing 2-cell lagoon with sprayfield, wastewater treatment facility occurred in 1983, based on the 1979 Facility Plan. The Coal Creek outfall was abandoned at this time. The new facility extended the design capacity to 0.368 MGD. The WWTP was designed for a Class II reliability standard, as defined by the Department.

In 1987 lagoon cell #2 received a significant upgrade. The lagoon's aeration system was upgraded, a drain pipe was installed beneath the lagoon, and a flexible membrane, high density polyethylene liner was installed in the lagoon. The underdrain pipe was necessary because ground water was infiltrating into the lagoon. The underdrain pipe conducts groundwater away from the lagoon to an adjacent control manhole and from there the groundwater is piped about ¼ mile to an outfall located in a small creek that flows into Coal Creek.

In 1995, the Utility District (SPUD) prepared a Comprehensive Sewer System Plan, the purpose of which was to provide a detailed evaluation of the sewer system in order to recommend system improvements. The 1995 plan recommended: 1) extensive collection system upgrades, including infiltration and inflow (I&I) reduction, 2) the addition of a 3rd lagoon that would extend the system's design capacity, and 3) improvements for the Utility District's planning and management activities.

The following Utility District history was excerpted from the1995 Plan:

> Snoqualmie Pass Utility District of King and Kittitas Counties was previously divided at the county line into separate entities for the respective counties. The Summit Sewer District was in King County and the Kittitas County Sewer District No. 1 was in Kittitas County. After an extensive rehabilitation program in 1973, Kittitas County Sewer District No. 1 assumed all wastewater collection and treatment responsibilities. However, it was not until September 1984, that voters in both King and Kittitas Counties voted to consolidate the two districts into one district.
>
> In October 1984, the Summit Sewer District and Kittitas County Sewer District No. 1 were officially consolidated under the new name of Snoqualmie Pass Sewer District of King and Kittitas Counties. The Snoqualmie Pass Utility District provides sewer and water service to both King and Kittitas Counties. In 1994 the District was renamed to more accurately depict its service and responsibilities. The water and sewer utility are now subdivisions under the name Snoqualmie Pass Utility District.

In October 2002, SPUD submitted a Wastewater Facility Plan Update to the Department. The Department approved this document in May 2003, as an engineering report, after receiving the requested amendments to the plan from SPUD. The plan could not be accepted as a facility plan because it didn't have the required State Environmental Review Process documentation and also did not include a cost-effective alternative upgrade plan, as stipulated by regulation (WAC 173-240-050

USFS Special Use Permit

The United States Forest Service (USFS) issued Special Use Permit's to SPUD to operate a wastewater treatment system on USFS land. The permit includes the following language:

> This permit covers 68.5 total acres and/or 2.15 total miles and is issued for the purpose of:
>
> A. Spraying treated waste water effluent. A pipe gallery building (6' x 18' x12'), housing manifold valves to control spray pipes and a spray field detail is included as shown on Exhibit B, also a detail of the ground water monitoring sites is included as shown on Exhibit E.

B. A lagoon holding pond for liquid waste disposal to accommodate a sewer system, and spray field as shown on Exhibit A.
C. Maintaining a strip of land 15 feet wide, 7 1/2 feet wide on each side of the center line, and 11,336 lineal feet of sewer line, as shown on Exhibits A, C, and D.

The most recent amendment to the Special Use Permit was signed the General Manager of SPUD and the Mt. Baker Snoqualmie National Forest Supervisor January 1990.

Collection System Status

SPUD has made significant progress in reducing the infiltration and inflow (I&I) into the collection system which in the past have been a significant proportion of the winter's flow to the lagoons. The average annual precipitation at Snoqualmie Pass is 105 inches. Unless the collection system is tightly sealed, significant precipitation events have the potential of adding considerable inflow into the system.

SPUD has applied the most recent technologies to reduce I&I, such as shaping the pavement around the sewer manholes to prevent snowplow damage, as well as pressure grouting of each sewer manhole. As a result, the 2002 Facility Plan did not have to identify an alternative upgrade that specified increased influent flow design criteria. Any increased wastewater flow from residential growth and/or ski area visits is more than offset by the reduction in I&I.

The Utility District's I&I reduction program has resulted in lower influent flow rates, although the exact proportion of I&I and influent volumes is difficult to determine, due to variation in the number of year to year skier visits. As a result, the need for a third lagoon to extend the design capacity of the treatment system was lessened.

Treatment Processes

Snoqualmie Pass Utility District's wastewater treatment system utilizes a two-cell in series partially aerated lagoon system, followed by discharge of partially treated effluent to a sprayfield, detailed below. Lagoon cell #1 has a volume of 3.51 million gallons and cell #2 has a volume of 7.0 million gallons, with an additional "emergency storage" capacity of 10 million gallons. An aeration system upgrade for the lagoons was identified by the 2002 Facility Plan. In 2004, the fine bubble diffusers in lagoon cell #1 were replaced with three 5-horsepower Aqua-Aerobics Aqua Jet aerators and lagoon cell #2 was provided with four 3-horsepower aerators of the same design in 2005. Effluent is disinfected by the injection of chlorine into the effluent pipe at the operation building. The chlorine has adequate contact time with the effluent as it flows through the 1-mile long, 10" diameter pipe to the sprayfield to assure adequate disinfection occurs.

Other upgrades planned for the 2006 to 2007 timeframe include a new automated headworks screen and headworks building, lagoon cell #1 by-pass piping, a new underdrain for lagoon cell

#1, and replacement of the liner in lagoon cell #1 after the new headworks screen and bypass piping to cell #2 is installed.

Sprayfield Distribution System

The sprayfield is located approximately one mile east of the lagoons on USFS land, on a southeast facing slope and is forested with second-growth timber.

The sprayfield includes seven separate zones (denoted A, B, C, D, E, F, G), covering a total of 47.5 acres. Wastewater application is rotated between the sprayfield zones on a daily basis, with no zone receiving more than 2" of wastewater per day. An application rate of 2" per day to an individual zone will be within the proposed permit limit of 2"/week, as given in **S1. Permit Limitations**, if the application of wastewater is rotated through each zone by the day of the week. Each sprayfield area has varying number of lateral lines containing several sprinkler heads. Sprayfield sprinkler heads are pressure restricted to balance out (even out) effluent application over the wastewater treatment area. The sprayfield pipe gallery valve manifold for the different zones is located in a below-ground vault just above the Forest Service Road 9070. This road defines the sprayfield's lower boundary.

Since 1986, effluent flow to the sprayfields has been monitored with a magnetic flow meter. As each of the spray-fields seven zones has a different square footage under irrigation, the mag-meter's rate of flow in gallons per minute is used to calculate the pump run time to avoid applying over 2 inches of wastewater.

A ground cover survey of the sprayfield was conducted in 1988 for SPUD by Brown & Caldwell. The study results revealed the following coverage's related in percentages of the total area: vegetation -92.3%; rock -1.1%; steep terrain -0.6%; stream -0.1%; bare ground -5.9%.

Wastewater application to the sprayfields occurs mostly in the winter, since this is the period when the large majority of the wastewater is generated due to winter-time skier visits. For example, there was no wastewater applied to the sprayfields in August & September of 2002, September 2003, June, July, August of 2004, and July, August of 2005. The December through April snow pack depth at Snoqualmie Pass averages approximately 65 inches (source: USFS Northwest Avalanche Center; period of record: 1929 -2005).

Warm spring-time temperatures, or rain on snow events any time in the winter, often result in a rapidly melting snow-pack can cause partially treated effluent to run off into the dissecting creeks to Lake Keechelus, without the benefit of land treatment. Effluent sprayed onto snow during periods of cold air temperature could freeze the top layer of the snow pack, causing a hard crust to form. This snow crust layer would likely preclude percolation of effluent through the snow pack. For these reasons, the winter-time application of lagoon treated effluent on the snow-pack overlaying the sprayfield at Snoqualmie Pass needs to be carefully monitored.

Residual Solids

As of 2005, the treatment facilities had no headworks to remove incidental solids (rags, scum, grit, screenings and other debris), although new headworks are due to be installed in 2006. The incidental solids are removed as part of the routine maintenance of lagoon cell #1. Grit, rags, scum and screenings are drained and disposed of as solid waste at the local landfill. Solids are removed from the bottom of the lagoons on an infrequent basis, treated, then land applied under a permit from the Kittitas Health District.

GROUND WATER

The sprayfield soils are from the Chinkmin series. These are moderately well drained soils formed in colluvium. These soils are shallow to moderately deep and overlie cemented glacial till. Loam with increasing grain size is found from 4 inches to the top of moderately cemented glacial till, which lies generally between 32 and 60 inches below the surface.

The following paragraph from the 2002 Facility (engineering) report provides additional hydrological information regarding the sprayfield: "The spray-field site is vegetated and lies on steep slopes. The soil is a typical forest soil that contains moderate amounts of soil organic matter, decomposing forest litter, and rocks (gravels and cobbles). The soil is shallow to moderately deep and there are significant vertical and downslope components to water flow. Because both annual precipitation and irrigation amounts are high, near saturated flow conditions occur routinely in the spray-field and the watershed displays rapid hydrologic response."

SPUD has installed a network of groundwater monitoring devices in and downgradient from the sprayfield.

PERMIT STATUS

The previous permit written for this facility was issued September 1982 to Kittitas County Sewer District No. 1 for the operation of the wastewater treatment facility. A series of temporary permits have been issued to SPUD since the 1982 permit expired in 1987, approximately every five years, while several studies were conducted on the treatment system. The temporary permits were based on the State Waste Discharge applications submitted by SPUD.

The most recent application for permit renewal was submitted to the Department on July 25, 2005 and accepted by the Department on July 26, 2005.

SUMMARY OF COMPLIANCE WITH THE PREVIOUS PERMIT

The facility last received an inspection on September 22, 2005.

During the history of the previous permit, the Permittee has remained in compliance with the monthly average effluent volume applied to the sprayfield of 0.368 MGD, based on Discharge Monitoring Reports (DMRs) submitted to the Department.

Two Class II inspections conducted by the Department in 1984 and 1988 revealed non-compliance with the Permittee's current permit stipulation that no effluent applied to the sprayfield enter into surface waters of the State. Both inspections discovered that some fraction of applied effluent was running off into streams located within the sprayfield.

WASTEWATER CHARACTERIZATION

The concentration of pollutants in the discharge was reported in the permit application and in discharge monitoring reports. The wastewater discharge prior to land application is characterized for the following parameters:

Table 1: Influent and Effluent Flows (January 2001 - July 2005)

Parameter	Units	Average Daily	Monthly Maximum [a]
Influent Flow	MGD	0.105	0.267
Effluent Flow	MGD	0.162	0.423
Effluent Flow [b]	MGD	0.138	0.362
[a] Averaged for the months January 2001 - July 2005			
[b] Effluent flow values calculated including summer months of no sprayfield application.			

Effluent flow rates greater than the influent flow rates may be attributed to the significant volume of precipitation falling on the lagoon's surface.

Table 2: Influent Wastewater Characterization (January 2002 - July 2005)

Parameter	Units	Average Daily	Monthly Maximum [a]
5-day Biochemical Demand	mg/L	57.8	86.8
5-day Biochemical Demand	lbs/day	41.3	67.3
Total Suspended Solids	mg/L	63.3	97.4
Total Suspended Solids	lbs/day	44.8	76.5
Temperature	C °	9.1	9.7
		Minimum Daily	**Maximum Daily**
pH	Standard Units	7.0	7.5
[a] Averaged for the months January 2002 - July 2005			

Table 3: Effluent Wastewater to Sprayfield Characterization [a] (January 2002 - July 2005)

Parameter	Units	Average Daily	Monthly Maximum [a]
5-day Biochemical Demand	mg/L	8.4	10.2
5-day Biochemical Demand	lbs/day	25.6	32.5
Total Suspended Solids	mg/L	4.7	5.6
Total Suspended Solids	lbs/day	14.2	17.7
Ammonia as N	mg/L	16.2	17.0
Ammonia as N	lbs/day	49.9	55.0
Nitrate as N	mg/L	2.0	2.1
Nitrate as N	lbs/day	6.0	6.8
Total Kjeldahl Nitrogen	mg/L	NA	18.6
Chlorine	lbs/day	1.8	2.1
Total Residual Chlorine	mg/L	0.1	0.2
Fecal Coliforms	colonies 100/mL	0.1	NA
Temperature	C °	10.7	11.4
		Minimum Daily	**Maximum Daily**
pH	Standard Units	7.1	7.3
[a] Averaged for the months January 2002 - July 2005			
[b] Effluent parameters calculated without summer months of no sprayfield application.			

SEPA COMPLIANCE

A determination of non-significance was signed on June 21, 1995 for the adoption of the SPUD General Comprehensive Plan for Sewers. The proponent and lead agency for this SEPA was the Snoqualmie Pass Utility District. Another determination of non-significance was signed on December 13, 2002 for the adoption the Wastewater Facilities Plan, updating the 1995 Comprehensive Plan for Sewers. The proponent for this SEPA was the Snoqualmie Pass Utility District.

Another determination of non-significance was dated July 18, 2005 regarding the proposed coverage under the Statewide Permit for Biosolids Management. After a review of a completed environmental checklist and other information on file, the Utility District determined the proposal would not have a probable significant adverse impact on the environment.

PROPOSED PERMIT LIMITATIONS

State regulations require that limitations set forth in a waste discharge permit must be either technology- or water quality-based. Wastewater must be treated using *all known, available, and reasonable treatment* (AKART) and not pollute the waters of the State. The minimum requirements, to demonstrate compliance with the AKART standard, are derived from the *Water Reclamation and Reuse Standards*, the *Design Criteria for Municipal Wastewater Land Treatment*, and Chapter 173-221 WAC.

Chapter 90.48 RCW, section 520 states, "In order to improve water quality by controlling toxicants in wastewater, the department of ecology shall in issuing and renewing state and federal wastewater discharge permits review the applicant's operations and incorporate permit conditions which require all known, available, and reasonable methods to control toxicants in the applicant's wastewater." This section ties AKART to the control of toxics, improvement of water quality, and the issuance of wastewater discharge permits.

In the Pollution Disclosure Act of 1971, Chapter 90.52 RCW, section 040 states "Except as provided in RCW 90.54.020(3)(b), in the administration of the provisions of chapter 90.48 RCW, the director of the department of ecology shall, regardless of the quality of the water of the state to which wastes are discharged or proposed for discharge, and regardless of the minimum water quality standards established by the director for said waters, require wastes to be provided with all known, available, and reasonable methods of treatment prior to their discharge or entry into waters of the state." This statute introduces the concept that AKART is required regardless of the quality of the receiving water.

The permit includes limitations on the quantity and quality of the wastewater applied to the sprayfield. The approved engineering report includes specific design criteria for this facility. The more stringent of the water quality-based or technology-based limits are applied to each of the parameters of concern. Each of these types of limits is described in more detail below.

TECHNOLOGY-BASED EFFLUENT LIMITATIONS

All waste discharge permits issued by the Department must specify conditions requiring available and reasonable methods of prevention, control, and treatment of discharges to waters of the state (WAC 173-216-110).

The following permit limitations are necessary to satisfy the requirement for AKART for the five year period of the proposed permit:

Table 4: Effluent Limitations to Sprayfield

EFFLUENT LIMITATIONS TO SPRAYFIELD			
Parameter	**Average Weekly**	**Average Monthly**	**Maximum Month**
Flow	Not Applicable	Not Applicable	0.368 Million gallons per day
5-day Biochemical Oxygen Demand	Not Applicable	33 mg/L	Not Applicable
Total Suspended Solids	Not Applicable	18 mg/L	Not Applicable
Fecal coliforms	200 colonies / 100 ml	Not Applicable	Not Applicable
pH	shall be between 6.0 and 9.0		
Maximum Application Rate to Sprayfield	At no time shall exceed 2.0 inches / week to any sprayfield zone.		

The BOD5 and TSS average monthly effluent limitations are based on the 99th percentile of the reported weekly lab results for the period January 2001 through July 2005. The maximum month flow rate is based on the WwTF's design capacity as given in the 2002 engineering report (Snoqualmie Pass Utility District Wastewater Facility Plan Update). The fecal limitation is based on Design Criteria For Municipal Wastewater Land Treatment Systems For Public Health Protection. The pH limitation is based on WAC 173-221-040. Chapter 173-221 WAC is the State's regulation for domestic wastewater facilities. The maximum weekly application rate to the sprayfield zones is based on the maximum effluent design flow.

GROUND WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's ground waters including the protection of human health, WAC 173-200-100 states that waste discharge permits shall be conditioned in such a manner as to authorize only activities that will not cause violations of the Ground Water Quality Standards. Drinking water is the beneficial use generally requiring the highest quality of ground water. Providing protection to the level of drinking water standards will protect a great variety of existing and future beneficial uses.

Applicable ground water criteria as defined in Chapter 173-200 WAC, and in RCW 90.48.520 for this discharge include, but are not limited to, the following:

Table 5: Ground Water Quality Criteria

Parameter	Criteria
Chloride	250 mg/L
Sulfate	250 mg/L
Nitrate	10 mg/L
pH	6.5 to 8.5 standard units

The Department has reviewed existing records and has determined that background ground water quality is better than the criteria given in Chapter 173-200 WAC. Seven control sites and seventeen downgradient ground water sampling sites were sampled for a suite of parameters on eighteen separate days from November 8, 1994 to April 18, 1997. The sampling sites consisted of lateral ground water collectors installed at 3 depths. These same sites were sampled for a more limited suite of parameters in February, March, and May of 2000. The result of the 2000 sampling is presented in Table 6 below. The Table shows the impact to Ground Water Quality by the Permittee's effluent discharges.

Table 6: Ground Water Characterization

Parameter	Control Sites	Downgradient Sites
NH4-N (ammonia)	0.12 mg/L	0.29 mg/L
NO3-N (nitrate)	0.11 mg/L	1.04 mg/L
Organic - N (organic nitrogen)	0.64 mg/L	0.69 mg/L
Chloride (anionic form of chlorine)	1.89 mg/L	4.60 mg/L
PO4-P (orthophosphate)	0.04 mg/L	0.09 mg/L
SO4-S (sulfate)	0.56 mg/L	0.64 mg/L

Although the Department has the regulatory authority to use the background ground water quality as the criteria in the proposed permit, it chooses not to do so in the upcoming permit cycle. The Permittee has proposed that an alternate point of compliance for the wastewater discharge be established according to procedures set forth in the Implementation Guidance for Ground Water Quality Standards. The feasibility of an alternate point of compliance may be determined when the next permit is prepared, five years hence.

The proposed permit requires that a Water Quality Monitoring Project be conducted to better establish the discharge's impact to the environment at the alternate point of compliance. The requirements of this Project are detailed later in this fact sheet.

Table 7 below presents the only groundwater-based permit limitation in the proposed permit.

Table 7: Groundwater Quality-based Limitations.

Parameter	Limitation
Hydraulic Loading to Sprayfield	0.368 MGD

Antidegradation of Ground Water

The State of Washington's Antidegradation Policy is based on RCW 90.48.010 (the Water Pollution Control Act) and RCW 90.54.020 (the Water Resources Act). The Antidegradation policy as described in Chapter 173-200 Water Quality Standards for Ground Water of the State of Washington has a two tiered approach. As stated in WAC 173-200-030 Antidegradation Policy:

> (2)(a) "Existing and future beneficial uses shall be maintained and protected and degradation of ground water quality that would interfere with or become injurious to beneficial uses shall not be allowed."
>
> (2)(c) Whenever ground waters are of a higher quality than the criteria assigned for said waters, the existing water quality shall be protected, and contaminants that will reduce the existing quality thereof shall not be allowed to enter such waters, except in those instances where it can be demonstrated to the department's satisfaction that:
>
> (i) An overriding consideration of the public interest will be served; and
>
> (ii) All contaminants proposed for entry into said ground waters shall be provided with all known, available, and reasonable methods of prevention, control, and treatment prior to entry.

WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established Surface Water Quality Standards. The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) is a State regulation designed to protect the beneficial uses of the surface waters of the State. For surface water discharges, the more stringent of the water quality-based or technology-based limits are to be applied to each of the parameters of concern, except for those limits established in Chapter 173-221 WAC, Discharge Standards and Effluent Limitations for Domestic Wastewater Facilities.

Antidegradation of Surface Waters

The State of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when receiving waters are of higher quality than the criteria assigned, the existing water quality shall be protected. More information on the State Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

Table 8 presents the results of the analysis of water samples collected from two of the creeks that flow through the sprayfield. The samples were collected at four different locations of the two creeks: where the creeks enter the sprayfield (above) and where the creeks exit the sprayfield (below).

Table 8: Monitoring Results from Sprayfield Streams.

Parameter	Creek 1 Below	Creek 1 Above	Creek 2 Below	Creek 2Above
Nitrate as N (mg/L)	2.58	0.19	0.37	0.19
Ammonia as N (mg/L)	0.06	0.06	0.06	0.04

The results indicate statistically significant elevated concentrations of nitrate in the downgradient sampling stations in both creeks. [Statistical tests of the sampling results are presented in Appendix C - Technical Calculations] While not as obvious, the average ammonia concentration downgradient in Creek 2 is also significantly elevated when compared to the upstream concentration. As a result, the Permittee is being given a Schedule of Compliance that will assure that the existing water quality of the creeks flowing through the sprayfield is protected.

COMPARISON OF LIMITATIONS WITH THE EXISTING PERMIT ISSUED SEPTEMBER 1982

Table 9: Comparison of Previous and New Limits

Parameter	Existing Limits	Proposed Limits
Hydraulic Loading to Sprayfield	0.368 MGD	0.368 MGD
BOD	NONE	33 mg/L Avg monthly
TSS	NONE	18 mg/L Avg monthly
Fecal Coliform	NONE	200 colonies / 100 ml average weekly
pH	NONE	shall be between 6.0 and 9.0 at all times

MONITORING REQUIREMENTS

Monitoring, recording, and reporting are specified to verify that the treatment process is functioning correctly, that ground water criteria are not violated, and that effluent limitations are being achieved (WAC 173-216-110).

INFLUENT AND EFFLUENT MONITORING

The influent and effluent monitoring and testing schedule is detailed in the proposed permit under Conditions S2 MONITORING REQUIREMENTS. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

WATER QUALITY MONITORING PROJECT

The permit requires the Permittee to conduct a Water Quality Monitoring Project. The Project requires the monitoring of both ground and surface water quality at the site in order to determine if the land treatment of effluent is capable of meeting ground and surface water standards defined in Chapter 173-200 WAC, Chapter 173-201A WAC, and in RCW 90.48.520.

This hydrogeologic study will be based on soil and hydrogeologic characteristics and be capable of assessing impacts of the WWTF's discharge on ground water and adjacent surface waters.

The monitoring plan is required be based on the January 2002 report prepared by **Kennedy & Jenks Consultants** entitled Groundwater Monitoring Plan Snoqualmie Pass Utility District Wastewater Treatment Plant Snoqualmie Pass, Washington (subject to the Department's revisions given below). The Permittee has previously agreed to conduct a comprehensive sprayfield monitoring program based on the Kennedy/Jenks Report during the proposed permit's cycle.

In April 2002 the Department submitted comments to the various sections of the Kennedy/Jenks' Report. These comments are given in the sections below:

Section 2.1 Basic Monitoring Program

1. A method of accounting for ground water quality upgradient of the sprayfield will be necessary. This would likely require one or more additional ground water monitoring wells to be consistent with surface water monitoring and the direction of the proposed ground water monitoring plan.
2. Abandonment of the lateral flow collectors is acceptable if a reliable method of measuring ground water quality within the sprayfield is substituted. It may be advisable to retain the collectors until after the monitoring wells are installed and operational.

3. The number and locations for the proposed monitoring wells appears conceptually adequate to accomplish the need for compliance monitoring. The final locations will be worked out on the ground. The Department is willing to work with SPUD to establish these locations.
4. Use of existing piezometers H2a-2,4,5 and H4a-2,4,5 to continue to assess the suitability of those locations as alternate points of compliance is acceptable. Initially, it may be desirable to include the existing control station C3 in the monitoring plan to improve the understanding of the significance of data obtained from monitoring in the hyporheic zone. Inspection of the data from the 3 sets of piezometers indicates that there is a significant change in concentration of most parameters between the H2a/H4a sites and the background site.
5. It is acceptable to composite hyporheic piezometer samples for laboratory analysis at each sample site.
6. The 2 pairs of upstream and downstream surface water monitoring stations are acceptable. The locations are required to be recorded by located Global Positioning Satellite (GPS) system. They are required to be located at the same position as previous studies.

Section 3.1 Monitoring Well Installation

The decision process for choosing between horizontal and vertical wells is required to be specified in the approved Sprayfield Management Plan. Given the unique hydrogeologic setting of the sprayfield, there is some level of risk that the type of well and/or the location of the well may not meet the monitoring objectives. As a result, more than one round of well installation may be necessary.

Section 3.2.4, Purging and Field Parameters

The sprayfield management plan is required to account for sampling methodologies required by each type of well installation.

Section 3.2.5, Sampling

The approved Sprayfield Management Plan may require field filtering of the water samples. This requirement would be based on the likelihood that sediment in the wells interfere with the basic cation/anion analyses required in the monitoring plan. Field filtering with specification of total analysis is preferred over lab filtering due to potential reduction/oxidation changes during storage and transit of the samples. The Department will consider an alternative to analyze for TSS in the wells.

Table 2, Monitoring Summary and Rationale, and Appendix C

1. The list of parameters and locations is acceptable subject to the guidance provided above to Section 2.1, and the addition of fecal coliform to the ground water and surface water sampling parameters.
2. The frequency presented in Table 2 for the first year of monitoring is acceptable. The Permittee may request reduction of sampling frequency after one year of monitoring.
3. The approved Sprayfield Management Plan is required to include a schedule for determining the point of compliance to meet ground water standards.

In 2006, the Department required two additional changes to the Kennedy/Jenks Plan:

1. Elimination of the Plan's original Appendix B - Hydraulic and Constituent Loading Limits. These limits are given in the permit's Special Condition 1 Discharge Limitations and are therefore redundant and not subject to annual revision. The Plan's original Appendix C is required to be the revised Plan's Appendix B;

2. Substitution of sampling of Total Phosphate for the original plan's stipulation that Ortho-phosphate be sampled. The substitution is necessary because WAC 173-201A-030 Lake Nutrient Criteria is set according to the trophic state of the ambient Total Phosphorus. A limit on Total Phosphorus may be given in the following permit, particularly if a NPDES permit is issued to SPUD.

3. All monitoring of effluent parameters from the lagoons to the sprayfield are to be specified in the permit's S2. Wastewater Monitoring and excised from the Appendix B of the revised Kennedy Jenks monitoring section.

LAB ACCREDITATION

The Snoqualmie Pass Utility District Laboratory is accredited through 7-21-2006, for the following parameters:

Table 10: List of Accredited Parameters

General Chemistry			
Parameter Name	**method**	**reference**	**matrix ***
Ammonia	4500-NH3 C	SM 18	N
Biochemical Oxygen Demand, BOD/CBOD	5210 B	SM	N
Chlorine Residual, Total	4500-Cl G	SM	N
Dissolved Oxygen	4500-O G	SM	N
Nitrate	4500-NO3 E	SM	N
Nitrogen, Total Kjeldahl	4500-Norg B	SM	N
Ph	4500-H	SM	N
Solids, Total Suspended	2540 D	SM	N
Microbiology			
Parameter Name	**method**	**reference**	**matrix ***
Fecal Coliform - count	9222 D	SM	N
* Matrix key: D = drinking water; N = non-potable water; S = solids/chem materials; A = air			

OTHER PERMIT CONDITIONS

REPORTING AND RECORDKEEPING

The conditions of S3. are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-216-110).

FACILITY LOADING

The design criteria for this treatment facility are taken from the October 2002 Wastewater Facilities Plan prepared by Environmental Management & Engineering, Inc. and are as follows:

Monthly average flow (max. month): 0.368 MGD

The permit requires the Permittee to maintain adequate capacity to treat the flows and waste loading to the treatment plant (WAC 173-216-110[4]). The Permittee is required to submit an

engineering report when the plant reaches 85% of its flow or loading capacity. For significant new discharges, the permit requires a new application and an engineering report (WAC 173-216-110[5]).

In December 2005, the USFS released a Draft Environmental Impact Statement (DEIS) that addresses the Summit at Snoqualmie Master Development Plan (MDP). The MDP was developed by Ski Lifts Incorporated, the owner/operator of the ski resorts at Snoqualmie Pass. The purpose of the MDP is to upgrade and expand the recreational infrastructure and associated facilities of the ski resort. The DEIS adopts a preferred alternative that estimates a 39% growth in comfortable carrying capacity for the skier guests through the 10-year planning period. Wastewater volume generated during the peak month may be expected to increase as a result of these planned improvements. During the three most recent years, the average monthly influent flow volume to SPUD's treatment plant was 0.10 MGD, and the highest single month flow was 0.26 MGD. Since 85% of loading capacity for this facility is 0.313 MGD, any significant increase in skier visits may result in a requirement to plan for an expansion of treatment plant capacity.

OPERATIONS AND MAINTENANCE

The proposed permit contains condition S.5. as authorized under RCW 90.48.110, WAC 173-220-150, Chapter 173-230 WAC, and WAC 173-240-080. It is included to ensure proper operation and regular maintenance of equipment, and to ensure that adequate safeguards are taken so that constructed facilities are used to their optimum potential in terms of pollutant capture and treatment.

The facility's current O&M Manual is dated July 1982, with a 1988 amendment. The proposed permit requires the submittal of a new O&M Manual no later than [insert date **two** years after effective date of permit]. The manual is required to include (S5.G.5) an Appendix A - Sprayfield Operating Limitations, and an Appendix B - Monitoring, Record Keeping, and Reporting Requirements. These Appendices constitute the Permittee's Sprayfield Management Plan. The Sprayfield Management Plan is required to be submitted to the Department no later than **August 1, 2006**. Annual updates to the Sprayfield Management Plan or a review confirmation letter are required to be submitted to the Department annually in years following the initial plan submittal.

RESIDUAL SOLIDS HANDLING

To prevent water pollution the Permittee is required in permit condition S6. to store and handle all residual solids (grit, screenings, scum, sludge, and other solid waste) in accordance with the requirements of RCW 90.48.080 and State Water Quality Standards.

The final use and disposal of biosolids from this facility is regulated by Ecology under Chapter 70.95J RCW and Chapter 173-308 WAC "Biosolids Management". The disposal of other solid waste is under the jurisdiction of the local health district.

Requirements for monitoring sewage sludge and recordkeeping are included in this permit. This information will by used by Ecology to develop or update local limits and is also required under 40 CFR 503.

PRETREATMENT

WAC 173-216-110 requires that the list of prohibitions in WAC 173-216-060 be included in the permit.

Federal pretreatment requirements in 40 CFR 403 and Sections 307(b) and 308 of the Clean Water Act apply to this facility. Therefore notification to the Department is required when pretreatment prohibitions are violated and when new sources of commercial or industrial wastewater discharge are added to its system.

There are no significant industrial users within SPUD jurisdictional boundaries. The utility district does receive wastewater from several commercial businesses, which are primarily food-service orientated. SPUD has a Sewer Administrative Code (Resolution 95-2) which regulates the usage of public sewers. Article VIII sets forth a list of prohibited practices and discharges to the sewer.

AS-BUILT DRAWINGS

The permit requires (S10.) that copies of as-built engineer drawings of wastewater treatment plant improvements be submitted to the Department no later than [insert date 2-years after effective date of permit]. These upgrades to the treatment plant were identified in the 2002 Facility Plan and have been partially constructed as of the date this fact sheet was written. Further upgrades are planned for the 2006 - 2007 timeframe. This submittal is required by Chapter 173-240 WAC.

GENERAL CONDITIONS

General Conditions are based directly on state laws and regulations and have been standardized for all industrial waste discharge to ground water permits issued by the Department.

Condition G1 requires responsible officials or their designated representatives to sign submittals to the Department. Condition G2 requires the Permittee to allow the Department to access the treatment system, production facility, and records related to the permit. Condition G3 specifies conditions for modifying, suspending or terminating the permit. Condition G4 requires the Permittee to apply to the Department prior to increasing or varying the discharge from the levels

stated in the permit application. Condition G5 requires the Permittee to submit written notice of significant increases in the amount or nature of discharges (typically new industrial discharges) into the sewer system tributary to the permitted facility. Condition G6 requires the Permittee to construct, modify, and operate the permitted facility in accordance with approved engineering documents. Condition G7 prohibits the Permittee from using the permit as a basis for violating any laws, statutes or regulations. Condition G8 requires the payment of permit fees. Condition G9 describes the penalties for violating permit conditions.

RECOMMENDATION FOR PERMIT ISSUANCE

This proposed permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to control toxics, and to protect human health and the beneficial uses of waters of the State of Washington. The Department proposes that the permit be issued for 5 years.

REFERENCES FOR TEXT AND APPENDICES

Faulkner, S.P., Patrick Jr., W.H., Gambrell, R.P., May-June, 1989. Field Techniques for Measuring Wetland Soil Parameters, Soil Science Society of America Journal, Vol. 53, No.3.

Washington State Department of Ecology, 1998. Criteria for Sewage Works Design

Washington State Department of Ecology, 1993. Guidelines for Preparation of Engineering Reports for Industrial Wastewater Land Application Systems, Ecology Publication # 93-36. 20 pp.

Washington State Department of Ecology and Department of Health, 1997. Water Reclamation and Reuse Standards, Ecology Publication # 97-23. 73 pp.

Washington State Department of Ecology.

Laws and Regulations(http://www.ecy.wa.gov/laws-rules/index.html)

Permit and Wastewater Related Information
(http://www.ecy.wa.gov/programs/wq/wastewater/index.html)

Washington State Department of Ecology, 1996. Implementation Guidance for the Ground Water Quality Standards, Ecology Publication # 96-02.

Washington State Department of Health, February 1994. Design Criteria For Municipal Wastewater Land Treatment Systems For Public Health Protection,

Washington State University, November, 1981. Laboratory Procedures - Soil Testing Laboratory. 38 pp.

APPENDIX A--PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to reissue a permit to the applicant listed on page one of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public notice of application was published on June 21, 2005 in the Yakima Herald Republic and the Ellensburg Daily Record to inform the public that an application had been submitted and to invite comment on the reissuance of this permit.

The Department will publish a Public Notice of Draft (PNOD) on March 23, 2006 in the Northern Kittitas County Tribune to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Water Quality Permit Coordinator
Department of Ecology
Central Regional Office
15 West Yakima Avenue, Suite 200
Yakima, WA 98902

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the 30 day comment period to the address above. The request for a hearing shall indicate the interest of the party and reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-216-100). Public notice regarding any hearing will be circulated at least 30 days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing.

Comments should reference specific text followed by proposed modification or concern when possible. Comments may address technical issues, accuracy and completeness of information, the scope of the facility's proposed coverage, adequacy of environmental protection, permit conditions, or any other concern that would result from issuance of this permit.

The Department will consider all comments received within 30 days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, 509/457-7105, or by writing to the address listed above.

This permit was prepared by Jim Leier.

APPENDIX B--GLOSSARY

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.

Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Average Monthly Discharge Limitation--The average of the measured values obtained over a calendar month's time.

Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD_5--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass--The intentional diversion of waste streams from any portion of the collection or treatment facility.

Chlorine--Chlorine is used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Compliance Inspection - Without Sampling--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance Inspection - With Sampling--A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Additional sampling may be conducted.

Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots.

Construction Activity--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.

Continuous Monitoring –Uninterrupted, unless otherwise noted in the permit.

Distribution Uniformity--The uniformity of infiltration (or application in the case of sprinkle or trickle irrigation) throughout the field expressed as a percent relating to the average depth infiltrated in the lowest one-quarter of the area to the average depth of water infiltrated.

Engineering Report--A document, signed by a professional licensed engineer, which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal Coliform Bacteria--Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab Sample--A single sample or measurement taken at a specific time or over as short period of time as is feasible.

Hyporheic Zone-- The region of saturated sediments beneath and beside the active channel and that contain some proportion of surface water that was part of the flow in the surface channel and went back underground and can mix with groundwater.

Industrial Wastewater--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.

Maximum Daily Discharge Limitation--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar

day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Method Detection Level (MDL)--The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is above zero and is determined from analysis of a sample in a given matrix containing the analyte.

pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.

Quantitation Level (QL)-- A calculated value five times the MDL (method detection level).

Soil Scientist--An individual who is registered as a Certified or Registered Professional Soil Scientist or as a Certified Professional Soil Specialist by the American Registry of Certified Professionals in Agronomy, Crops, and Soils or by the National Society of Consulting Scientists or who has the credentials for membership. Minimum requirements for eligibility are: possession of a baccalaureate, masters, or doctorate degree from a U.S. or Canadian institution with a minimum of 30 semester hours or 45 quarter hours professional core courses in agronomy, crops or soils, and have 5,3,or 1 years, respectively, of professional experience working in the area of agronomy, crops, or soils.

State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.

Total Coliform Bacteria--A microbiological test which detects and enumerates the total coliform group of bacteria in water samples.

Total Dissolved Solids--That portion of total solids in water or wastewater that passes through a specific filter.

Total Suspended Solids (TSS)--Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out

light and can promote and maintain the development of noxious conditions through oxygen depletion.

Water Quality-based Effluent Limit--A limit on the concentration of an effluent parameter that is intended to prevent pollution of the receiving water.

APPENDIX C--TECHNICAL CALCULATIONS

The statistical test files presented below were run with the Excel data Analysis ToolPak. The period of analysis was from January 2001 through July 2005.

This analysis reveals that the Nitrate-N (NO3-N) concentrations at the sampling station in Creek 1 below the sprayfield have only a 1 % probability of not exceeding the NO3 concentrations in Creek 1 above the sprayfield by 2.165 mg/L [P(T<=t) one-tail .00996].

t-Test: Two-Sample Assuming Unequal Variances

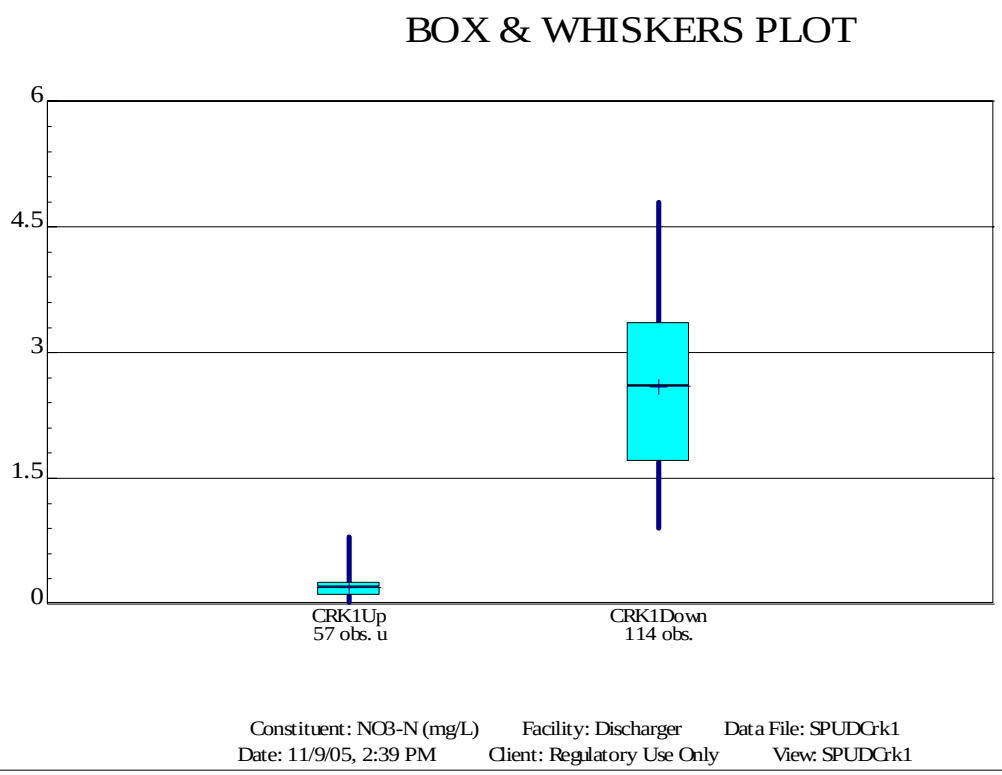
	CREEK 1 BELOW NO3	**CREEK 1 ABOVE NO3**
Mean Concentration NO3 mg/L	2.58	0.19
Variance	1.03	0.02
Observations	114	57
Hypothesized Mean Difference	**2.17**	
df	122	
t Stat	2.36	
P(T<=t) one-tail	**0.01**	
t Critical one-tail	1.66	
P(T<=t) two-tail	0.02	
t Critical two-tail	1.98	

This analysis reveals that the Nitrate-N (NO3-N) concentrations at the sampling station in Creek 2 below the sprayfield have only a 1 % probability of not exceeding the NO3 concentrations in Creek 2 above the sprayfield by 0.121 mg/L [P(T<=t) one-tail .0099].

t-Test: Two-Sample Assuming Unequal Variances

	CREEK 2 BELOW NO3	**CREEK 2 ABOVE NO3**
Mean Concentration NO3 mg/L	0.37	0.19
Variance	0.08	0.02
Observations	121	118
Hypothesized Mean Differenc	**0.12**	
df	165	
t Stat	2.35	
P(T<=t) one-tail	**0.01**	
t Critical one-tail	1.65	
P(T<=t) two-tail	0.02	
t Critical two-tail	1.97	

A box and whiskers plot assists in visualizing the relationship between upstream and downstream data. This type of plot shows the 25th and 75th percentile data values (the upper and lower limits of the box); the median value of the data (the horizontal line within the box, or 50th percentile); the mean value of the data (the "+" in the box); and the range of the data, which is indicated by the extent of the whiskers. The plot below presents the monitoring data in Creek 1 for nitrate as nitrogen (NO3-N). The plot shows that there is no overlap between the data, and therefore it may be concluded that there is a significant difference between the NO3-N concentrations upstream (CRK1Up) and downstream (CRK1Down) in this creek. A point of interest is that there are twice as many downstream samples as upstream. From this observation it can be concluded that the upstream site was not flowing at times when the downstream site registered flow. Further, since there are no tributary streams between the upstream and downstream sample sites, the flow at the downstream site represents base flow from ground water. Second, since the stream flow at the downstream sample site is derived from ground water, it may be concluded that the NO3-N concentrations at that site represent ground water conditions beneath the land treatment site.



Another statistical method for comparing upstream and downstream data is the tolerance limit. The tolerance limit is calculated from the upgradient, or background, data. The downstream data are then compared to the calculated value. Tolerance limits are calculated to account for specified confidence and coverage, expressed as percentages. In most instances, 95% is the percentage value selected for both confidence and coverage. As a result, the tolerance limit would be stated as: We are 95% confident that 95% of the current and future measurements of background are less than the calculated tolerance limit. If the confidence and coverage values are increased, the calculated tolerance limit will increase as well. More information may be found in the *Implementation Guidance for the Ground Water Quality Standards* (Ecology, 1996).

Applying the tolerance limit requires testing the upstream data for a normal distribution. If the data are normally distributed, the mean, and standard deviation are calculated, and a table value obtained for a constant that is based on the number of samples in the data set. These values are plugged in the following equation:

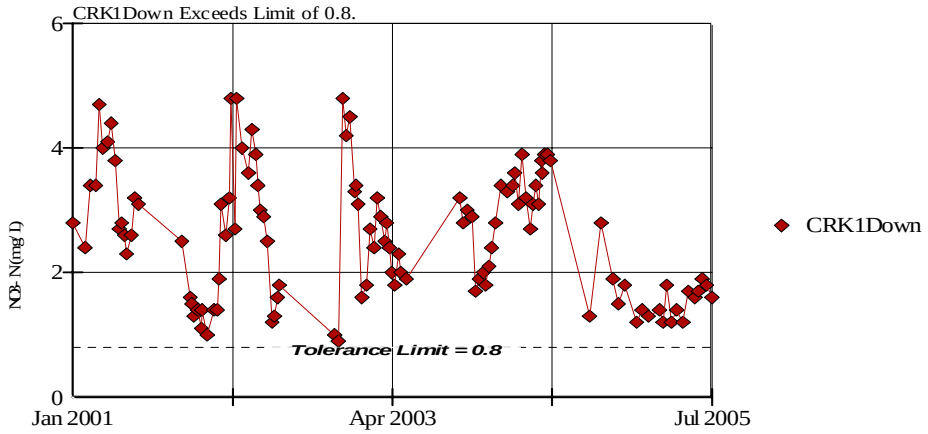
Tolerance limit = mean + standard deviation x constant

If the data are not normally distributed (non-parametric), the formula is not used and the highest value in the data is selected as the tolerance limit.

For the SPUD data for NO3-N in Creek 1, the upstream data were found to be not normally distributed, resulting in a non-parametric plot with a tolerance limit of 0.8 mg/L. A comparison of the tolerance limit obtained from the upstream data to the downstream data results in the following plot. The plot confirms the intuitive conclusion from the box and whiskers plot that there is a significant difference between the upstream and downstream data for NO3-N in Creek 1:

v.8.6.005. FOR USE BY STATE REGULATORS ONLY. EPA

NON-PARAMETRIC INTER-STATION TOLERANCE LIMIT



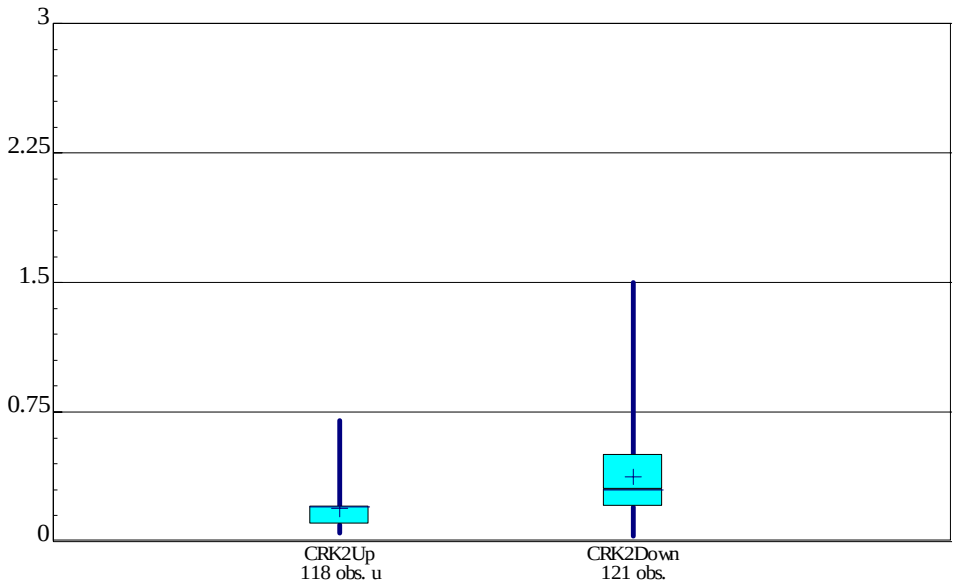
Testwise alpha = 0.05373 Most recent point compared to limit.
57 background observations. 92.38% coverage at alpha=0.01; 94.73% at alpha=0.05; 98.63% at alpha=0.5.
Non-P test used in lieu of Parametric Interwell Tolerance Limit after ladder of powers failed to adequately normalize data.

Constituent: NO3-N (mg/L) Facility: Discharger Data File: SPUDCrk1
Date: 11/10/05, 3:34 PM Client: Regulatory Use Only View: SPUDCrk1

The same evaluation for NO3-N data in the upstream and downstream samples for Creek 2 results in the following box and whiskers plot. For these data, there is overlap between the upstream and downstream data, but there are still apparent differences in the data between the sites:

v.8.6.005. FOR USE BY STATE REGULATORS ONLY. EPA

BOX & WHISKERS PLOT

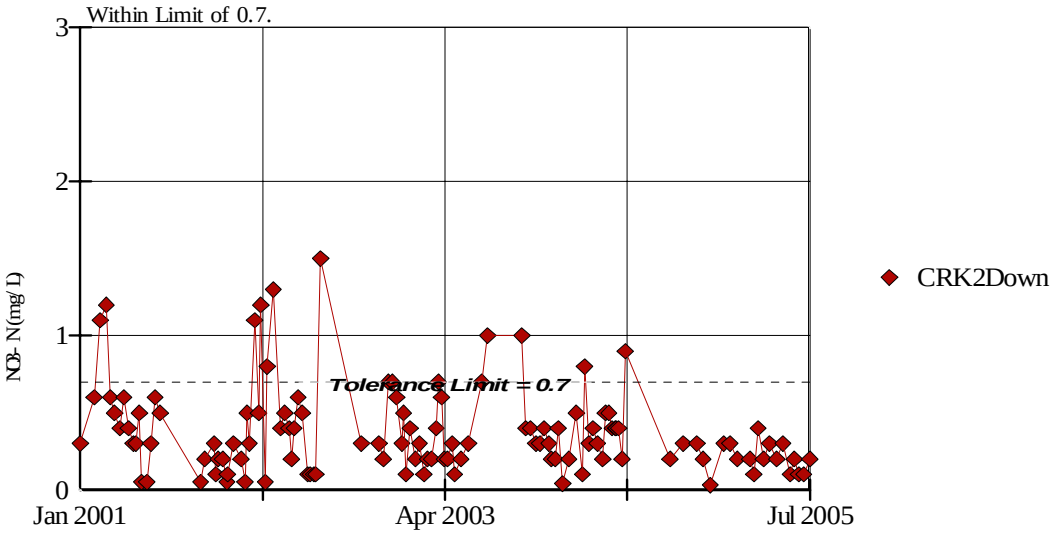


Constituent: NO3-N (mg/L) Facility: Discharger Data File: SPUDCrk2
Date: 11/9/05, 4:55 PM Client: Regulatory Use Only View: SPUDCrk2

Analysis by calculating the tolerance limit helps to resolve the question of whether there is a statistical difference between the upstream and downstream concentrations of NO3-N. The upstream data are found to be non-parametric in Creek 2, which results in the following plot:

v.8.6.005. FOR USE BY STATE REGULATORS ONLY. EPA

NON-PARAMETRIC INTER-STATION TOLERANCE LIMIT



118 background obs. Testwise alpha = 0.01 Most recent point compared to limit.
Non-P test used in lieu of Parametric Interwell Tolerance Limit after ladder of powers failed to adequately normalize data.

Constituent: NO3-N (mg/L) Facility: Discharger Data File: SPUDCrk2
Date: 11/9/05, 4:57 PM Client: Regulatory Use Only View: SPUDCrk2

Note that the plot indicates that the downstream data are within the tolerance limit of 0.7 mg/L. However, there were 15 values of NO3-N in the downstream site that equaled or exceeded the 0.7 value during the period of record from January 2001 through July 2005. The software program that is used to calculate the tolerance limit only evaluates the last data point for determining whether the data fall below the tolerance limit. For overall analysis of the effects of the land treatment site on the streams, we must compare the data obtained during the period of record to the tolerance limit, not just one value.

APPENDIX D--RESPONSE TO COMMENTS

The following comment was received by the Department of Ecology from the Snoqualmie Pass Utility District:

> "I have one final comment on our draft permit. On page 14, condition S5.A it states that ". . . operator certified for at least a Class II plant by the . . ." I can find no justification for that requirement in WAC 173-230-130 that would classify the treatment plant as a Class II. If Ecology insists on leaving that language in the permit, I would request to see the methodology used to arrive at that classification and that the District be allowed two years to comply. . . ."

The Department's Response: The permit will be revised in S5.A to read:

A. Certified Operator

An operator certified for a Class I plant by the state of Washington shall be in responsible charge of the day-to-day operation of the wastewater treatment plant. An operator certified for at Class I plant shall be in charge during all regularly scheduled shifts.